

Palouse River Monitoring Program 2001-2002

A Water Quality Sampling Project for the 303 (d) listed tributaries of the Palouse River within the State of Idaho.

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Developed for: **Latah Soil and Water Conservation District (LSWCD)
Idaho Department of Environmental Quality (DEQ)
Idaho Soil Conservation Commission (SCC)
Idaho State Department of Agriculture (ISDA)**

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Introduction:

The Palouse River Watershed is comprised of two major forks; the South Fork and North Fork. Each of these segments originate in forest regions in Idaho and flow independently to Washington where they later combine.

The South Fork of the Palouse River is 303 (d) listed from the headwaters to the Idaho-Washington border for bacteria, flow alteration, habitat alteration, nutrients, sediment, and temperature. The TMDL for the Palouse River Watershed is due in 2003. South Fork Palouse River is a small watershed with 13.42 stream miles from the headwaters to the Idaho-Washington border. This stream flows through forest and agricultural lands southeast of the city of Moscow. Several small farmsteads lie along the watershed providing a sub-urban aspect to the drainage. The South Fork Palouse originates on the southwest slope of Moscow Mountain from five main tributaries: headwaters South Fork Palouse, Howard Creek, Gnat Creek, Crumarine Creek, and Twin Creek. These tributaries are very small in size and combine near the intersection of Robinson Lake Road and Olsen Road.

The North Fork of the Palouse River originates on the western side of the Hoodoo Mountains in the St. Joe National Forest and then flows adjacent to the towns of Harvard, Princeton, and Potlatch before the river crosses into the State of Washington. The North Fork of the Palouse itself is not a 303 (d) listed waterbody but Deep, Gold, Big, Flannigan, West Fork of Rock and Hatter Creeks are 303 (d) impaired streams that are listed for bacteria, flow alteration, habitat alteration, nutrients, and sediment.

Monitoring Program:

This water quality monitoring program is intended to provide background data on the 303 (d) listed tributaries of the Palouse River for TMDL development. This monitoring plan was designed in coordination with the Lewiston Regional Office of the Idaho Department of Environmental Quality (DEQ), Latah Soil and Water Conservation District (LSWCD), and Soil Conservation Commission (SCC) and the Idaho Association of Soil Conservation Districts (IASCD) to fill data gaps that exist in the watershed. Monitoring near the headwaters, the agriculture-forest boundary and near the Idaho-Washington State line will enable managers to determine where loads are entering the stream to allow prioritization for the implementation of Best Management Practices (BMPs).

Specific parameters to be tested are total phosphorus (TP), bacteria (*Escherichia coli* and total coliform), nitrate+nitrite ($\text{NO}_3+\text{NO}_2\text{-N}$), ammonia (NH_3), turbidity, total suspended solids (TSS), instantaneous water temperature, continuous water temperature, dissolved oxygen (DO), and percent (%) saturation. With the exception of continuous temperature monitoring, the remaining parameters will be monitored on an instantaneous basis with sampling occurring every two weeks. This project is scheduled to begin November 2001 and continue through June 2002, at which time monitoring may continue contingent upon funding availability.

The University of Idaho Analytical Science Laboratory (ASL) will conduct all inorganic parameter testing. Bacteria analysis will be performed by the State of Idaho Health and Welfare Laboratory in Coeur d' Alene. All other measurements will be performed by Cary Myler of the IASCD, or other personnel under supervision. Continuous temperature dataloggers will be installed at representative sites.

This project is a cooperative effort between IASCD, ISDA, DEQ, and SCC. ISDA and IASCD will provide the personnel, sampling equipment, and technical expertise. DEQ will pay all laboratory costs incurred at the U of I ASL for $\text{NO}_3+\text{NO}_2/\text{NH}_3$, TP, and TSS as well as bacteria costs from the state bacteria laboratory in Coeur d' Alene for the duration of the project and fund a position at the LSWCD to collect the data. IASCD personnel will conduct the monitoring, perform data entry, and provide a summary report after the data has been gathered.

Program Objectives:

IASCD will cooperate with the (DEQ), (ISDA), (LSWCD) and local landowners in an attempt to complete the following goals:

1. Evaluate the water quality and discharge rates at selected locations on each 303 (d) listed tributary.
2. Attempt to determine which areas contribute to water quality exceedances or degradation.
3. Prioritize loading areas that may require BMP implementation or other possible management strategies.
4. Determine relationship between turbidity and total suspended solids.
5. Make data available to the public.

Site Description:

These sites are shown on the map on page 8.

PR-1 Located at the headwaters near Cedar Grove Lane.

PR-2 Tributary confluence near intersection of Robinson Park Road and Olsen Road.

PR-3 Located upstream of the City of Moscow.

PR-4 Located at the Idaho-Washington State line.

PR-5 Headwaters of Flannigan Creek.

PR-6 Near mouth of Flannigan Creek.

PR-7 Headwaters of WF Rock Creek.

PR-8 Near mouth of WF Rock Creek.

PR-9 Headwaters of Hatter Creek.

PR-10 Near Mouth of Hatter Creek.

PR-11 Near Mouth of Deep Creek.

PR-12 Mid Deep Creek.

PR-13 Headwaters of Deep Creek.

PR-14 Near mouth of Gold Creek.

PR-15 Gold Creek forest boundary.

PR-16 Near mouth of Big Creek.

PR-17 Big Creek forest boundary.

Sampling Methods

Water Quality

With the exception of bacteriological samples, each grab sample will be composited into a 2.5-gallon polyethylene churn sample splitter. The resultant composite sample will then be thoroughly homogenized and poured off into properly prepared sample containers. Nutrients water samples that require preservation will be obtained in preserved (H_2SO_4 pH <2) 500 mL. sample containers. The polyethylene churn splitter will be thoroughly rinsed with ambient water at each location prior to sample collection. Bacteriological samples will be collected directly from mid-stream flow into properly prepared sterile sample bottles. Refer to Table 1 for a list of parameters, analytical methods, preservation, and holding times.

All sample containers will be equipped with sample labels that will be filled out using water proof markers with the following information: station location, sample identification, date of collection, and time of collection. Clear packing tape will be wrapped around each sample bottle and its label to insure that moisture from the coolers does not cause the loss of sample labels. All resultant samples will be placed within a cooler, on ice, to await shipment to the laboratory. Chain-of-Custody forms will accompany each sample shipment. All samples, except bacteria, will be shipped to the University of Idaho ASL for analyses. Bacteria samples will be sent to the State of Idaho

Health and Welfare Laboratory in Couer d' Alene for analysis. Samples will be shipped either the same day or early the next morning to meet 30-hour holding time.

Table 1. Water Quality Parameters

| Parameters | Sample Size | Preservation | Holding Time | Method |
|---|-------------|--|--------------|------------------------|
| Non Filterable Residue (TSS) | 1L | Cool 4°C | 7 Days | EPA 160.2 |
| Nitrogen(NO ₃ +NO ₂) Ammonia (NH ₃) | 60 mL | Cool 4°C, H ₂ SO ₄ pH < 2 | 28 Days | EPA 353.2 EPA 350.1 |
| Total Phosphorus (TP) | 100 mL | Cool 4°C, H ₂ SO ₄ pH < 2 | 28 Days | EPA 365.4 |
| <i>Escherichia coli</i> (<i>E. coli</i>) | 100 mL | Cool 4°C | 30 Hours | MPN |

Field Measurements

At each location, field parameters of dissolved oxygen, specific conductance, pH, temperature and total dissolved solids will be measured. These measurements will be taken, when possible, from a well-mixed section, near mid-stream at approximately mid-depth. Calibration of all field equipment will be in accordance with the manufacturer's specifications. Refer to Table 2 for a listing of field measurements, equipment and calibration techniques.

Table 2 Field Measurements

| Parameters | Instrument | Calibration |
|-------------------|---|--|
| Dissolved Oxygen | YSI Model 55 | Ambient air calibration |
| Temperature | YSI Model 55 StowAway temperature logger Model XTI 02 | Centigrade thermometer Centigrade thermometer |
| Conductance & TDS | Orion Model 115 | Specific Conductance (25°C) |
| PH | Orion Model 210A | Standard buffer (7,10) bracketing for linearity |
| Turbidity | Hach Model 2100P | Formazin Primary Standard |

All field measurements will be recorded in a bound log book along with any pertinent observations about the site, including weather conditions, flow rates, personnel on site or any potential problems observed that may affect the quality of data.

Flow Measurements

Flow measurements will be collected by wading and using a Marsh McBirney Flow Mate Model 2000 flow meter. The six-tenth-depth method (0.6 of the total depth below water surface) will be used when the depth of water is less than or equal to three feet. For depths greater than three feet the two-point method (0.2 and 0.8 of the total depth below the water surface) will be employed. At each gauging station, a transect line will be established across the width of the drain/creek at an angle perpendicular to the flow. The mid-section method for computing cross-sectional area along with the velocity-area method will be used for discharge determination. The discharge is computed by summation of the products of the partial areas (partial sections) of the flow cross-sections and the average velocities for each of those sections. This method will be used to calculate cubic feet per second at each of the monitoring stations.

Quality Assurance and Quality Control (QA/QC)

The ASL utilizes methods approved and validated by EPA. A method validation process, including precision and accuracy performance evaluations and method detection limit studies, are required of all of ASL Standard Methods. Method performance evaluations include quality control samples, analyzed with a batch to ensure sample data integrity. Internal laboratory spikes and duplicates are all part of ASL's quality assurance program. Laboratory QA/QC results generated from this project can be provided upon request.

QA/QC procedures from the field-sampling portion of this project will consist of duplicates (at 10% of the sample load) along with blank samples (one set per sampling day). The field blanks will consist of laboratory-grade deionized water, transported to the field and poured off into a prepared sample container. The blank sample is used to determine the integrity of the field teams handling of samples, the condition of the sample containers supplied by the laboratory and the accuracy of the laboratory methods. Duplicates consist of two sets of sample containers filled with the same composite water from the same sampling site. The duplicates are used to determine both field and laboratory precision. The duplicate and blank samples will not be identified as such and will enter the laboratories blindly for analyses. Both the duplicates and blank samples will be stored and handled with the normal sample load for shipment to the laboratory.

Bacteria water samples will be shipped from the Idaho Department of Health and Welfare building in Moscow to the laboratory in Couer d' Alene where the samples will be ran within the 30 hour holding time. Their procedures use MPN (most probable number) by Quantitray test to determine *E. coli* and total coliform concentrations. The laboratory in

Couer d' Alene is certified by the State of Idaho to conduct laboratory analysis of bacteria.

Data Handling

All of the field data and analytical data generated from each survey will be submitted to ISDA for review. Each batch of data from a survey will be reviewed to insure that all necessary observations, measurements, and analytical results have been properly recorded. The analytical results will be reviewed for completeness and quality control results. Any suspected errors will be investigated and resolved, if possible. The data will then be stored electronically and made available to any interested entity. Monthly progress reports will be sent from the IASCD to the DEQ. These reports will include: a status report of the field monitoring, an electronic copy of the data, and an overall update of the project.

Data use

The data generated from this monitoring program will be used by IASCD, DEQ, SCC, and the LSWCD to determine loads within the stream, identify areas where BMP's would have the greatest benefit, provide baseline data prior to TMDL development, and identify changes as BMP's are implemented. Data will also be available to other agencies and the general public. This data will specifically be used by the DEQ for TMDL development for the Palouse River Watershed.

Palouse River

